

Three new species of *Leucopogon* (Ericaceae: Styphelioideae: Styphelieae) from the far south-west of Western Australia

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Abstract

Hislop, M. Three new species of *Leucopogon* (Ericaceae: Styphelioideae: Styphelieae) from the far south-west of Western Australia. *Nuytsia* 18: 61–78 (2008). Two new species, *Leucopogon altissimus* Hislop and *L. wheelerae* Hislop, are described. A third taxon, *L. richei* (Labill.) R.Br. var. *acutifolius* Benth., is elevated to species level under a new name, *L. interstans* Hislop, and with an expanded circumscription. All three are illustrated and their distributions mapped. Full descriptions of the species *L. alternifolius* R.Br. and *L. australis* R.Br., which are morphologically similar to *L. wheelerae* and *L. interstans* respectively, are given for purposes of comparison. Lectotypes are designated for the following taxa: *L. alternifolius* R.Br., *L. australis* R.Br., *L. interruptus* R.Br., *L. paniculatus* Sond., *L. polystachyus* R.Br. and *L. polystachyus* var. *serratifolius* Sond.

Introduction

Leucopogon R.Br. is the largest genus within Ericaceae subfamily Styphelioideae, a grouping which now accommodates all of the genera previously belonging to the family Epacridaceae (Kron *et al.* 2002). This reclassification retains the tribe Styphelieae in close to its original concept, to include all of the drupaceous genera except *Oligarrhena* R.Br. and *Needhamiella* L. Watson, which were transferred to the new tribe Oligarrheneae.

Recent molecular and morphological research (Taaffe *et al.* 2001; Quinn *et al.* 2003) has convincingly demonstrated that *Leucopogon s. lat.* is polyphyletic. Within this assemblage however, there is a large monophyletic species group that includes the type species, *L. lanceolatus* (Sm.) R.Br., and therefore represents *Leucopogon s. str.* The morphological characters that define *Leucopogon s. str.* are given in Hislop and Chapman (2007). In the absence of an adequate formal infrageneric classification for *Leucopogon s. str.*, the paper also included the delineation of five informal groups within the Western Australian members of the genus. Three new species from one of these groups, the *L. australis* R.Br. species group (Group A), were also described there. The current paper provides descriptions of another two new species from the group, *L. altissimus* Hislop and *L. wheelerae* Hislop, and elevates *L. richei* (Labill.) R.Br. var. *acutifolius* Benth., with an expanded circumscription, to species level under the new name *L. interstans* Hislop.

In the course of this research, many types relevant to the group were examined and where possible lectotypes have been designated.

Methods

This study is based on observations of herbarium collections housed at PERTH. Relevant type specimens were obtained on loan from BM and MEL, while images of others housed at K and G have also been examined. In the case of the type images from K, additional critical observations of the specimens themselves were provided by Juliet Wege, the 2005–06 Australian Botanic Liaison Officer.

Details of the methods used to measure plant parts and make other morphological observations are the same as those described previously in Hislop & Chapman (2007).

The distribution map was compiled using DIVA-GIS version 5.2.0.2 and based on PERTH specimen data.

Notes on lectotypifications

Two Australian taxonomists, W.-L. Chew and later J.M. Powell, were active in the study of the genus *Leucopogon* between the 1970s and the 1990s. During this period they examined type collections at the British Museum, and selected lectotypes for a number of *Leucopogon* species described by Robert Brown, but both later retired without effecting these lectotypifications.

The Brown lectotypes designated in this paper follow the intentions of these earlier authors, except in the case of *L. australis*, where Powell had nominated a specimen from the Port Dalrymple [Tasmania] gathering, while I have selected a sheet from the earlier King George Sound [Western Australia] material.

Taxonomy

Leucopogon alternifolius R.Br., *Prod. Fl. Nov. Holl.* 543 (1810). *Styphelia alternifolia* (R.Br.) Spreng., *Syst. Veg.* 1: 655 (1824). *Type*: Cape Howe [Western Australia], December 1801, R. Brown s.n. (*lecto*, here designated: BM 000929069!; *isolecto*: BM 000929070!, PERTH 04161130!)

Low, sprawling *shrubs* to 40 cm high and 40 cm wide, single stemmed at ground level with fire sensitive rootstock. Young *branchlets* very slender, pale brown or reddish-brown, glabrous, older stems overlain with fissured grey bark. *Leaves* spirally arranged, variably antrorse, ovate or broadly ovate, 2.3–6.1 mm long, 1.8–5.2 mm wide; apex acute and usually recurved; base cordate, often deeply so, ± stem clasping; petiole indistinct, greenish-yellow, to 0.3 mm long but mostly shorter, glabrous; lamina 0.1–0.2 mm thick, usually concave, often deeply so with the adaxial surface ± folded longitudinally, but becoming slightly recurved towards the margins, occasionally ± flat; surfaces discolorous, glabrous, adaxial surface slightly shiny, venation not or barely evident, abaxial surface paler with 7–9 primary veins and significant development of secondary veins, the midrib not differentiated; margins slightly thickened, entire or denticulate. *Inflorescence* erect, spreading or ± decurved, terminal and axillary, the latter extending down the flowering branchlets for many (sometimes as many as 20) nodes, occasionally the upper inflorescences branched; axis usually distinctly flexuose, glabrous, 3–9 mm long, with 3–11 flowers terminating in a bud-like rudiment, the flowers erect and sessile. *Fertile bracts* broadly ovate to ovate, 0.7–0.9 mm long, 0.6–0.9 mm wide, obtuse to subacute; abaxial surface with

rather conspicuous venation, glabrous or papillose; adaxial surface sparsely appressed-hairy; margins minutely ciliate. *Bracteoles* ovate, 0.5–0.8 mm long, 0.5–0.6 mm wide, subacute to acute, keeled; abaxial surface usually papillose about the keel, glabrous elsewhere, the central portion greenish or often suffused red-purple and the venation rather conspicuous, paler and scarious towards the margins; adaxial surface appressed-hairy in basal half; margins minutely ciliate. *Sepals* narrowly ovate to ovate, 1.0–1.5 mm long, 0.4–0.7 mm wide, acute; abaxial surface usually papillose, the central portion greenish, often suffused purple, the venation especially the midrib rather conspicuous, pale, becoming scarious towards margins; adaxial surface with appressed hairs towards the apex; the margins minutely and irregularly ciliate with hairs <0.05 mm long. *Corolla tube* white, broadly and shallowly campanulate, shorter than the sepals, 0.5–0.8 mm long, 1.2–1.4 mm wide, glabrous externally and internally. *Corolla lobes* white or pale pink, longer than the tube (ratio = 1.4–2.2:1), spreading widely from base, 1.0–1.4 mm long, 0.7–0.9 mm wide at base, glabrous externally, rather sparsely bearded internally, with the surface clearly visible between the hairs, indumentum white, 0.2–0.4 mm long near apex, glabrous tip *c.* 0.1 mm long. *Anthers* partially exerted from tube (by 2/3 to 3/4 of length), 0.4–0.7 mm long, slightly recurved at apex; sterile tips very obscure, 0.15–0.25 mm long; *filaments* terete, attached 1/2–2/3 above anther base, 0.3–0.4 mm long, adnate to tube just below sinus. *Ovary* globose, 0.3–0.4 mm long, 0.3–0.4 mm wide, papillose towards apex, 2- or 3-locular; *style* 0.3–0.4 mm long, tapering abruptly from base to the narrow apex, papillose, included within the corolla tube; *stigma* not expanded; *nectary* annular, 0.1–0.2 mm long, shallowly lobed, glabrous. *Fruit* usually compressed and \pm circular, broadly elliptic or asymmetrically elliptic in outline when one or two ovules develop, occasionally trigonous when all three ovules develop, glabrous, 0.9–1.2 mm long, 0.7–1 mm wide, \pm the same length or a little longer than calyx at maturity, the surface with a conspicuous raised reticulum; style persistent. (Figures 1A, B)

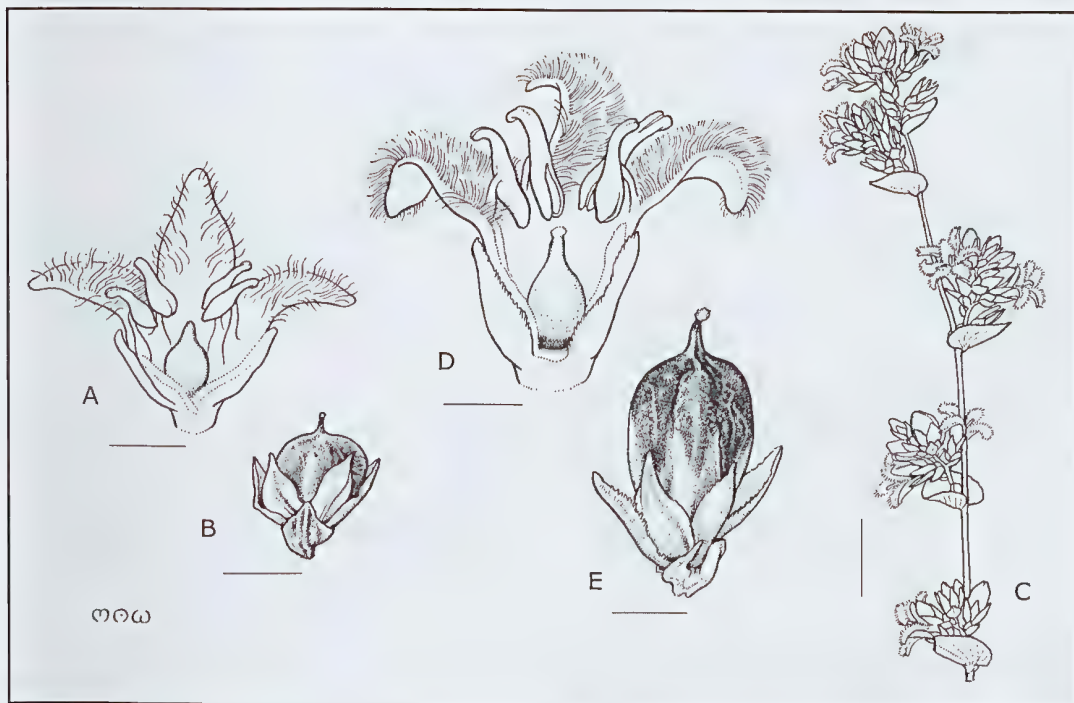


Figure 1. *Leucopogon alternifolius*. A – flower, longitudinal section; B – fruit. *Leucopogon wheeleri*. C – flowering branchlet; D – flower, longitudinal section; E – fruit. Scale bars: A, B, D, E = 1 mm; C = 5 mm. Drawn by Margaret Wilson from A.R. Anells & R.W. Hearn 4423 (A), A.R. Anells 1999 (B), S. Paust 254 (C, D), M. Hislop 3680 (E).

Other specimens examined. WESTERNAUSTRALIA: [localities withheld] 24 Dec. 1902, Cecil Andrews s.n. (PERTH); 20 Nov. 1991, A.R. Annels 1999 (CANB, PERTH); 14 Sep. 1994, A.R. Annels & R.W. Hearn 4423 (PERTH); 5 Nov. 1994, B.G. Hammersley 1275 (PERTH); 10 Sep. 1986, G.J. Keighery 8363 (CANB, PERTH); Aug. 1933, A. Meebold 11642 (PERTH); 1 Dec. 1988, G. Wardell-Johnson s.n. (PERTH).

Distribution and habitat. Occurs between Walpole and Albany (Figure 2), where it grows in and around swamps, in heath or occasionally open woodland.

Conservation status. *Leucopogon alternifolius* was previously included as a Priority taxon on the Department of Environment and Conservation (DEC) Conservation Codes for Western Australian Flora but was removed in 1992, mainly as a result of the discovery of large, new populations on the Scott River Plains. These are now recognised as belonging to a separate species, *Leucopogon wheelerae* Hislop, described below. This has necessitated a re-evaluation of the conservation status of *L. alternifolius* s. str. The latter is currently known from relatively few populations, most of which are protected within the conservation estate. However with a restricted distribution in one of the wettest areas of southern Western Australia it may become vulnerable in the medium term if, as predicted, anthropogenic climate change leads to hotter and drier conditions across the species' range. Consequently *L. alternifolius* has been recently re-listed as Priority Three under DEC Conservation Codes for Western Australian Flora.

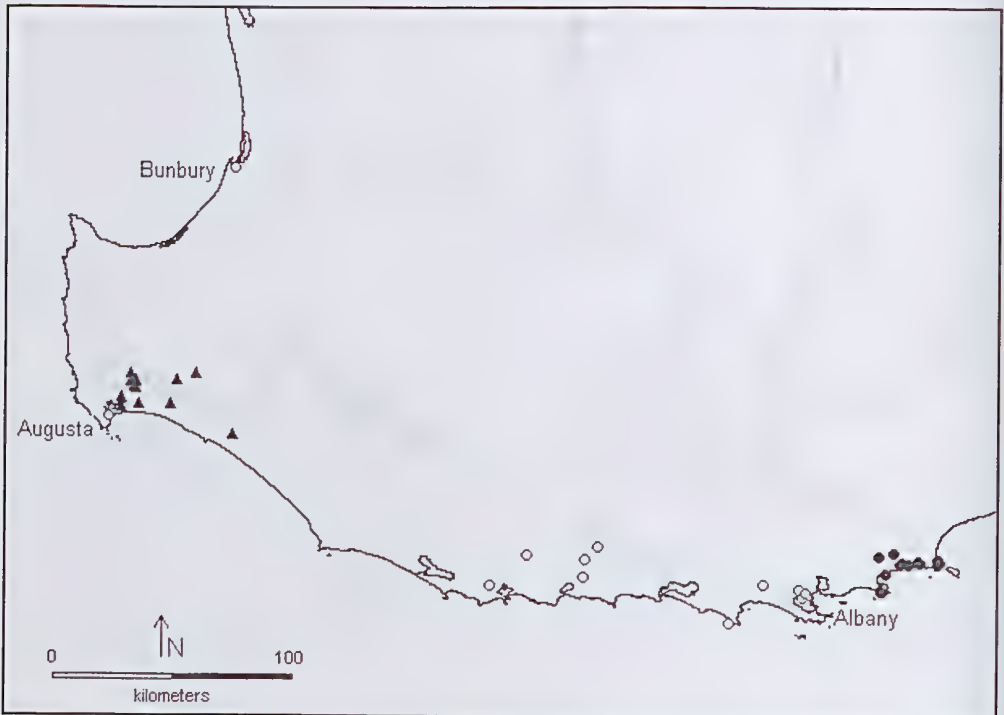


Figure 2. Distribution of *Leucopogon alternifolius* (○), *L. altissimus* (●), and *L. wheelerae* (▲) in south-west Western Australia. Interim Biogeographic Regionisation Version 6.1 (Department of the Environment, Water, Heritage and the Arts 2008) boundaries are indicated in grey.

***Leucopogon altissimus* Hislop, sp. nov.**

Leucopogi parvifloro sed inflorescentia decurva et axe inflorescentiae glabro differt.

Typus: east of Albany, Western Australia [precise locality withheld for conservation reasons], 26 August 2006, *M. Hislop* 3635 (*holo*: PERTH 07467532; *iso*: CANB, K, MEL, NSW).

Tall, erect *shrubs* to c. 3 m high and 2 m across, single stemmed at ground level with a fire-sensitive rootstock. Young *branchlets* pale to copper brown, glabrous, older stems overlain with \pm fissured grey bark. *Leaves* spirally arranged, antrorse, usually steeply so, narrowly elliptic to elliptic, 22–48 mm long, 6–13 mm wide; apex acute; base attenuate; petiole rather indistinct, similar in texture to the lamina, pale brown or yellow-brown, to 2 mm long, glabrous; lamina 0.15–0.25 mm thick, \pm flat or very slightly convex adaxially; the surfaces discolorous, adaxial surface shiny, glabrous, with 5–7 flat or slightly sunken veins evident, abaxial surface paler, glabrous, striate, with 5–7 raised primary veins and many conspicuous, secondary veins, the midrib not differentiated; margins scabrous at least in the distal half with stiff antrorse hairs < 0.1 mm long. *Inflorescence* terminal and upper-axillary, mostly decurved, although some terminal inflorescences may be \pm erect; axis usually distinctly flexuose, glabrous, 12–25 mm long, with 7–17 flowers, terminating in a bud-like rudiment or occasionally an attenuate point, the flowers sessile. *Fertile bracts* ovate, 0.8–1.4 mm long, 0.5–0.9 mm wide, obtuse; abaxial surface glabrous, with prominent venation; adaxial surface appressed-hairy; margins ciliolate. *Bracteoles* ovate, 1–1.3 mm long, 0.7–0.9 mm wide, subacute to acute, not or very obscurely keeled; abaxial surface glabrous, the central portion green occasionally flushed pink-purple towards the apex, becoming scarious towards the margins; adaxial surface shortly appressed-hairy; margins ciliolate. *Sepals* narrowly ovate to ovate, 1.6–2.4 mm long, 0.7–1.0 mm wide, obtuse to subacute; abaxial surface glabrous, greenish, the pale venation rather inconspicuous, becoming scarious towards the margins; adaxial surface appressed-hairy; the margins ciliolate with hairs c. 0.05 mm long. *Corolla tube* white, broadly campanulate, shorter than the sepals by up to 0.6 mm, 0.9–1.4 mm long, 1.2–1.6 mm wide, glabrous externally, mostly glabrous internally apart sometimes from a very sparse indumentum towards the top of the tube. *Corolla lobes* creamy-white, longer than the tube (ratio = 1.2–1.8:1), widely spreading from base and recurved, 1.6–2.1 mm long, 0.7–1 mm wide at base, glabrous externally, rather sparsely bearded internally with the surface readily visible between the hairs, very occasionally hairs reduced to papillae, indumentum white, 0.2–0.4 mm long near apex, the glabrous tip abruptly inflexed, 0.1–0.2 mm long. *Anthers* partially to almost completely exerted from tube (by at least 7/8 of length), 1–1.5 mm long, slightly recurved towards apex; sterile tips rather conspicuous, 0.3–0.5 mm long; *filaments* terete, attached 1/3 to a little over 1/2 above anther base, 0.5–0.7 mm long, adnate to tube just below sinus. *Ovary* ellipsoid, 0.5–0.6 mm long, 0.4–0.5 mm wide, glabrous, 3- or 4-locular; *style* 0.5–0.6 mm long, well defined, cylindrical for most of length; *stigma* not or only slightly expanded and presented at the top of the tube; *nectary* annular, 0.3–0.4 mm long, shallowly lobed for between 1/4 and 1/2 of length, glabrous. *Fruit* ellipsoid, with smoothly rounded shoulders, glabrous, 2.9–3.5 mm long, 1.9–2.1 mm wide, much longer than calyx, the surface with a raised reticulum of longitudinal and transverse ridges; style persistent. (Figure 3)

Other specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 6 Oct. 1992, *A.R. Annels* 2571 (CANB, PERTH); 27 Aug. 2006, *M. Hislop* 3637 (CANB, PERTH); 27 Aug. 2006, *M. Hislop* 3642 (PERTH); 27 Aug. 2006, *M. Hislop* 3643 (HO, PERTH); 27 Aug. 2006, *M. Hislop* 3644 (CANB, NSW, PERTH); 28 Aug. 2006, *M. Hislop* 3649 (CANB, NSW, PERTH); 27 Aug. 1986, *J.M. Powell* 2663 (HO, NSW, PERTH); 13 Nov. 2004, *E.M. Sandiford* EMS 994 (NSW, PERTH); 29 Aug. 1972, *G.T. Smith & L.A. Moore s.n.* (PERTH).



Figure 3. *Leucopogon altissimus*. A – flowering branchlet; B – fruiting inflorescence. Scale bars: A = 10 mm; B = 2 mm. Drawn by Margaret Wilson from M. Hislop 3635 (A), E.M. Sandiford EMS 994 (B).

Distribution and habitat. Currently known only from a small area east of Albany, between Two Peoples Bay Nature Reserve and Cheyne Beach, and north to the settlement of Manypeaks. (Figure 2) Within its very restricted distribution the species occurs in a surprising variety of habitats. It has been collected from hilltops, where it occurs in and around dense heath in shallow soils over granite, but also low in the landscape close to creek lines and on winter damp flats, where it may be a prominent species in the understorey of Marri woodlands in gravelly loam soils. The species even appears as a component of the vegetation of the fore-dunes growing in white sand under *Agonis flexuosa* and *Spyridium globulosum*.

Phenology. The main flowering period is between August and October with mature fruit present at least from October to December.

Etymology. From the Latin *altissimus* (highest, very tall), in reference to the unusual height (2–3 m) commonly reached by this species. Other tall western members of *Leucopogon s. str.* that sometimes grow to c. 2 m are *L. australis*, *L. parviflorus* (Andrews) Lindl., *L. verticillatus* R.Br. and *L. obovatus* (Labill.) R.Br. The latter grows alongside *L. altissimus* at the type locality.

Conservation status. *Leucopogon altissimus* is locally common and a number of populations are conserved in the Two Peoples Bay and Mount Manypeaks Nature Reserves and the Waychinicup National Park. However, the species has a very restricted geographical range which could render it especially vulnerable to any future threatening processes, including predicted anthropogenic climate

change leading to hotter and drier conditions in this part of the south coast. The susceptibility of the species to the fast spreading, rootrot pathogen *Phytophthora cinnamomi* Rands. has also not been established, but many epacrids are known to be vulnerable (Keighery 1996).

Leucopogon altissimus is recently listed as Priority Three under DEC Conservation Codes for Western Australian Flora.

Affinities. Older collections of this species at PERTH had been assigned either to *L. australis* or *L. parviflorus*. Although the three species share a similar leaf morphology, fertile specimens of *L. altissimus* have characteristically deflexed, glabrous inflorescence axes, a character which separates it from all other western members of *Leucopogon s. str.* with the exception of *L. alternifolius*. The latter often has spreading or deflexed, as well as erect inflorescences, but is a low sprawling shrub with ovate, more or less stem-clasping leaves.

Notes. Other members of Group A that have been observed growing sympatrically with *Leucopogon altissimus* are *L. parviflorus*, *L. obovatus* and *L. verticillatus*.

Leucopogon australis R.Br., *Prod. Fl. Nov. Holl.* 541 (1810). *Styphelia australis* (R.Br.) F.Muell., *Fragm.* 6: 43 (1867). *Type:* King George Sound [Western Australia], 11 December 1801–5 January 1802, R. Brown s.n. (*lecto*, here designated: BM 000929077!; *isolecto*: BM 000929078!). *Paralecto:* Port Dalrymple (Georgetown) [Tasmania], 5 January 1804, R. Brown s.n. (BM 000929076!).

Leucopogon drummondii DC., *Prod.* 7(2): 745 (1839). *Type:* ‘in Nova-Hollandia ad Swan-river cum plurib. aliis stirpibus rarissimis legit cl. Drummond!...(v.s.a. cl. inv.)’, J. Drummond s.n. (*holo:* G, microfiche seen; *iso:* K 000348325, K 000348326, scanned images seen).

Leucopogon paniculatus Sond. in Lehm., *Pl. Preiss.* 1(2): 306 (1845). *Type:* ‘in turfoso-humidis inter fructices densos ad marginem lacus planitiei haud longe ab oppidulo Albany, (Plantagenet), 11 Oct. 1840’, L. Preiss 374 (*lecto*, here designated: MEL 655770!).

Erect, robust *shrubs* to c. 2 m high and 1.8 m wide, but usually smaller, with fire tolerant rootstock. Young *branchlets* pale brown or straw-coloured, glabrous, the bark on older stems ± fissured, pale grey over reddish-brown. *Leaves* spirally arranged, antrorse, usually steeply so, narrowly ovate or narrowly elliptic, 22–75 mm long, 2.8–9.5 mm wide; apex acute or subacute; base cuneate; petiole usually well defined, pale to medium brown, 0.6–1.5 mm long, glabrous throughout or with a few hairs on the adaxial surface; lamina 0.1–0.25 mm thick, usually ± convex adaxially with slightly recurved margins, less often more prominently recurved or flat; surfaces discolorous, adaxial surface not shiny, glabrous, with 3–5 rather conspicuous, slightly sunken veins evident, abaxial surface paler, glabrous or with a sparse indumentum of short appressed hairs, striate, with 5–7 slightly raised primary veins, the midrib not differentiated; margins usually distinctly thickened and glabrous throughout, very occasionally with a few short, antrorse hairs about the apex. *Inflorescence* erect, terminal and upper-axillary; axis 8–34 mm long, with 8–28 flowers and terminating in a bud-like rudiment; indumentum of moderately dense to dense patent hairs, 0.08–0.2 mm long, the flowers erect and sessile. *Fertile bracts* ovate or broadly ovate, 0.7–1 mm long, 0.7–0.8 mm wide, obtuse; abaxial surface with moderately conspicuous venation, glabrous; adaxial surface glabrous; margins ciliolate. *Bracteoles* ovate or broadly ovate, 0.9–1.5 mm long, 0.9–1.3 mm wide, obtuse or subacute, sharply keeled; abaxial surface glabrous or with a few hairs along the keel, pale yellowish cream apart from the greenish keel; adaxial surface

glabrous; margins densely ciliolate. *Sepals* ovate, 1.2–1.9 mm long, 0.9–1.5 mm wide, obtuse; abaxial surface glabrous or very occasionally with a few hairs towards the base, the central portion greenish or yellowish green, the rest of the surface pale yellowish cream becoming \pm scarious towards the margins, the venation obscure to moderately conspicuous, pale; adaxial surface glabrous; margins densely ciliolate with hairs to *c.* 0.15 mm. *Corolla tube* white, broadly campanulate, about as long as or a little longer than sepals (by up to 0.4 mm), 1.0–1.5 mm long, 1.6–2.0 mm wide, glabrous externally and internally. *Corolla lobes* white, much longer than the tube (ratio = 1.3–2.1: 1), spreading from base and recurved, 2.3–2.7 mm long, 0.9–1.3 mm wide at base, glabrous externally, densely bearded internally, indumentum white, 0.5–0.6 mm long near apex, the glabrous tip to 0.2 mm long. *Anthers* usually partially exerted from the tube (by 3/4 to 7/8 of length), occasionally fully exerted, 1.3–2 mm long, slightly to prominently recurved at apex; sterile tips moderately conspicuous, 0.3–0.5 mm long; *filaments* terete, attached 2/3 to 3/4 above anther base, (0.7–)1–1.3 mm long, adnate to tube just below sinus. *Ovary* globose or depressed-globose, 0.5–0.7 mm long, 0.5–0.8 mm wide, glabrous, (4)5(6)-locular; *style* 0.5–0.8 mm long, either rather abruptly differentiated from ovary apex with parallel sides for most of length or tapering from ovary apex to a point *c.* half way up style and cylindrical above (*c.* 0.3 mm wide at base), included within corolla tube; *stigma* slightly to distinctly expanded; *nectary* annular 0.3–0.5 mm long, shallowly lobed for up to 1/4 of length or \pm entire, glabrous. *Fruit* depressed-globose, with smoothly rounded shoulders, quite prominently ribbed in immature fruit, glabrous, 1.8–2.2 mm long, 2.5–3.3 mm wide, much longer than calyx, the surface with prominent transverse and longitudinal ridges; style persistent. (Figure 4)

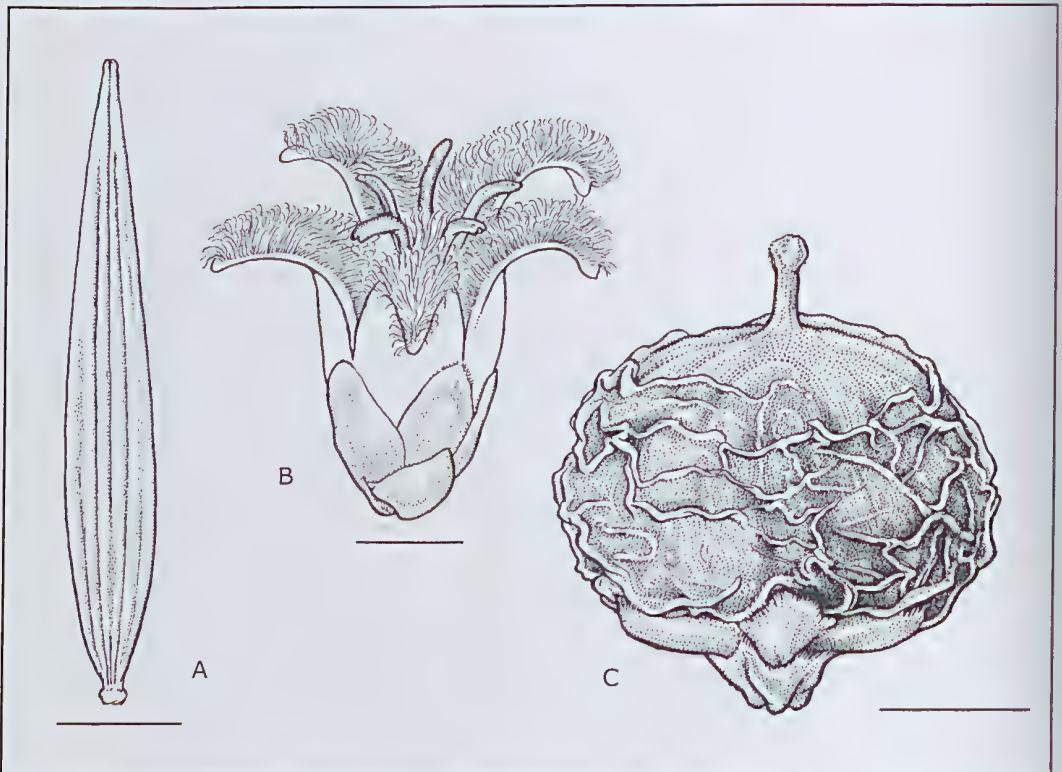


Figure 4. *Leucopogon australis*. A – leaf, adaxial surface; B – flower; C – fruit. Scale bars: A = 5 mm; B, C = 1 mm. Drawn by Margaret Wilson from R.J. Cranfield & B.G. Ward 913 (A, B), C. Godden, D. Bright & T. Annels SC 76.13 (C).

Other specimens examined. WESTERN AUSTRALIA: swampy ground Guildford, 5 Sep. 1907, *C. Andrews s.n.* (PERTH); Palings Rd, W of Manjimup, 21 Sep. 1988, *A.R. Annels* 367 (PERTH); N side of Apex Drive at start of Memorial Tree Drive [Albany], 5 Nov. 2004, *K. Baker* 166 (PERTH); Denmark Rd, just E of Marbellup Rd [W of Albany], 23 Oct. 1997, *E.A. Brown* 97/402, *P.G. Wilson & N. Lam* (CHR, NSW, NY, PERTH, UNSW); Ambergate Reserve, Busselton, 3 Aug. 1994, *D. Cooper* 4 (PERTH); 5.4 km SW from intersection between Trigwell Bridge Rd and McAlinden Rd, [SW of Collie], 30 Oct. 1997, *R.J. Cranfield* 11571 (PERTH); Sandy Rd, off Access Rd, 3 km E of Quininnup, 12 Sep. 1999, *R.J. Cranfield* 14023 (CANB, PERTH); Plot FC41, 100 m off Keene Rd on unnamed logging track, Barrabup Forest Block, 6 Sep. 2005, *R.J. Cranfield & B.G. Ward* FC 913 (PERTH); Bowelling–Duranillin Rd, W side of railway line and Wunnenberg Rd junction, 3 km SE of Bowelling, 5 Sep. 1994, *V. Crowley* DKN 549 (PERTH); Thompson ‘Highway’ [S of Lake Muir], 22 Nov. 1977, *H. Demarz* D6644 (PERTH); 300 m S down Della Rd from junction with Smiles Rd [SE of Margaret River], 12 Dec. 1996, *C. Godden, D. Bright & T. Annels* SC 76.13 (PERTH); Isle Rd 0.25 km S of South West Highway, [W of Walpole], 21 Oct. 1996, *M.S. Graham* MSG 626 (PERTH); close to Sues Bridge campsite, on Blackwood River, W of Nannup, 26 Nov. 2006, *M. Hislop* 3678 (PERTH, CANB, NSW); Christmas Tree Well, Brookton Highway, Beverley, 26 Sep. 2005, *F. Hort & J. Hort* 2627 (PERTH); Boonanarring Brook, 20 km NNE of Gingin, 1 Oct. 1988, *G.J. Keighery* 10285 (PERTH); Dingo Beach, West Cape Howe, 20 km W of Albany, 27 Nov. 1986, *G.J. Keighery* 11681 (PERTH); Modong Nature Reserve, Jandakot, 1 Oct. 1993, *G.J. Keighery* 12787 (PERTH); C. Milton property, 3 km S of Mount Barker, 25 Oct. 1977, *K.F. Kenneally* 6480 (PERTH); Long Swamp area, 2.6 km W from S end of Scott River Rd, 24 Aug. 1986, *J.M. Powell* 2631 (HO, K, NSW, PERTH). VICTORIA: Curdies River, 1890, *F. Hancock s.n.* (MEL 2121147); Foster, Gippsland Highlands, 1882, *Howitt [A.W.]* 150 (MEL 2117948); Cape Otway Range, Nov. 1886, *Rob Lucas s.n.* (MEL 2121154); Heaths between Curdies River and the Gillibrand [Gellibrand], Mar 1874, [*F. Mueller*] *s.n.* (MEL 2117947); Wilsons Promontory, *Musgrari s.n.* (MEL 2117997). TASMANIA: Georgetown, *S. Hannaford* 861 (MEL 2121165).

Distribution and habitat. *Leucopogon australis* occurs in the south-west of Western Australia, southern Victoria and northern Tasmania. In Western Australia it is widely distributed and locally common in the wetter parts of the South-West, always within *c.* 100 km of the coast, from Gingin *c.* 100 km N of Perth, to the Augusta area and along the south coast to Albany (Figure 5). In the north of its range it is restricted to creek lines and swamps, but in the wettest parts of the lower south-west it also occurs higher in the landscape, as a component of the forest understorey.

Affinities. See notes under *Leucopogon interstans*.

Notes. The description above is based on Western Australian material only. The few eastern collections examined differed in having rather smaller floral parts (towards the lower end, and sometimes below the size range encountered in the western material) and a sparse, appressed indumentum on the adaxial sepal surface. The taxonomic significance, if any, of these differences requires the examination of a much larger specimen sample than was available to the author. However given the wide disjunction between the eastern and western populations, some morphological differences are to be expected.

Leucopogon interruptus R.Br., *Prod. Fl. Nov. Holl.* 541 (1810). *Styphelia interrupta* (R.Br.) Spreng., *Syst. Veg.* 1 (1824). *Type:* Goose Island [Recherche Archipelago, Western Australia], January 1802, *R. Brown s.n.* (*lecto*, here designated: BM 000929089!; *isolecto*: BM 000929090!).

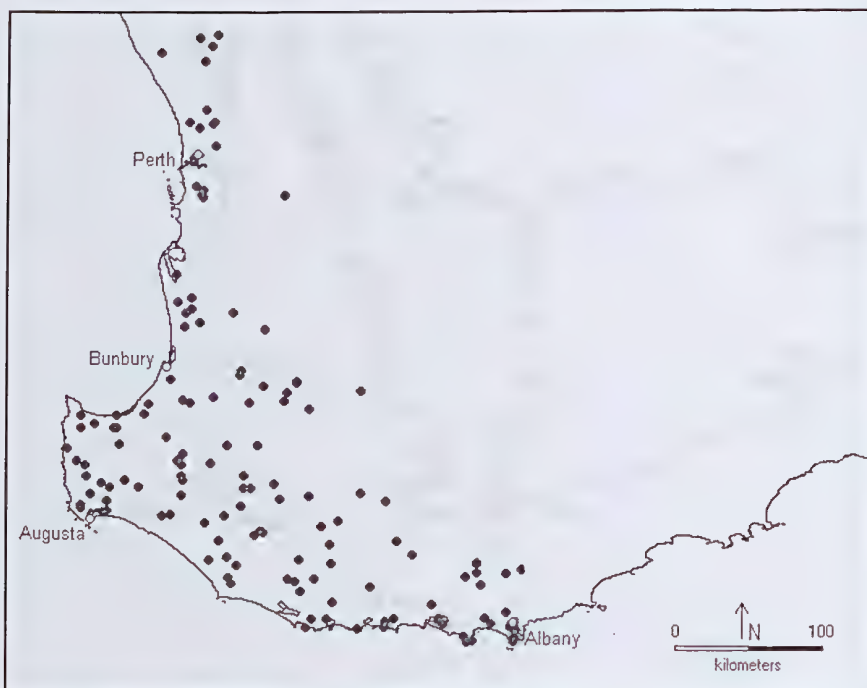


Figure 5. Distribution of *Leucopogon australis* (●) in south-west Western Australia. *Interim Biogeographic Regionisation Version 6.1* (Department of the Environment, Water, Heritage and the Arts 2008) boundaries are indicated in grey.

Leucopogon interstans Hislop, *sp. nov.*

Leucopogon australis affinis sed marginibus folii scabris, sepalis magis acutis et fructo ellipsoideo vel globoso differt.

Typus: Perillup Community Hall area, Muir Highway [SE of Rocky Gully], Western Australia, 24 July 1982, J.M. Powell 1958 (*holo*: PERTH 01841858; *iso*: CANB, K, L, MEL, NSW).

Leucopogon richei (Labill.) R.Br. var. *acutifolius* Benth., *Fl. Austral.* 4: 186 (1869). *Type*: 'Stirling Range, F. Mueller'. (*holo*: K 000348269, scanned image seen).

Leucopogon australis R.Br. subsp. *acutifolius* (Benth.) J.M.Powell ms., in G. Paczkowska & A.R. Chapman, *West. Austral. Fl.: Descr. Cat.* p. 238 (2000), *nom. inval.*

Erect, *shrubs* to c. 1.5 m high, but usually less than 1 m, and 1.2 m wide across, with fire-tolerant rootstock. Young *branchlets* light brown or reddish brown, with a sparse or less often moderately dense indumentum of very short patent hairs, < 0.1 mm long (sometimes hairs confined to nodal areas), at length glabrescent; bark on older stems pale grey over reddish brown and often rather stringy. *Leaves* spirally arranged, antrorse, usually steeply so, narrowly elliptic, or less often narrowly ovate or narrowly obovate, 13–53 mm long, (1–)1.3–5 mm wide; apex acute or subacute; base attenuate or cuneate; petiole varying from indistinct to moderately well defined, light brown or yellowish brown.

similar in texture to the lamina, 0.7–1.3 mm long, shortly hairy on adaxial surface and margins, glabrous abaxially; lamina 0.15–0.25 mm thick, slightly concave, flat or slightly convex adaxially; surfaces somewhat discoloured, adaxial surface not or barely shiny, glabrous, except sometimes immediately above the petiole, with 3–5 rather indistinct, slightly sunken veins, abaxial surface paler, glabrous, \pm striate, with 5–7 usually slightly raised primary veins, the midrib not differentiated; margins scabrous with stiff, antrorse hairs to 0.2 mm long. *Inflorescence* erect, terminal and upper-axillary; axis 7–23 mm long, with 5–14 flowers, terminating in a bud-like rudiment; indumentum of moderately dense to dense, patent or slightly retrorse, straight hairs, 0.08–0.15 mm long, flowers erect and sessile. *Fertile bracts* ovate or broadly ovate, 0.7–1 mm long, 0.7–0.8 mm wide, obtuse; abaxial surface with conspicuous venation, shortly hairy towards the base and sometimes also close to the apex; abaxial surface shortly hairy; margins ciliolate. *Bracteoles* ovate, 0.9–1.5 mm long, 0.7–1 mm wide, acute or subacute, keeled; abaxial surface with short patent hairs along the entire length of the keel, or restricted to apical and basal portions only, very sparsely hairy or glabrous elsewhere, reddish-purple, becoming scarious towards margins; adaxial surface appressed-hairy; margins densely ciliolate. *Sepals* ovate or narrowly ovate, (1.2–)1.4–2.2 mm long, 0.7–1.2 mm wide, subacute or acute; abaxial surface glabrous throughout or with a few hairs towards apex, the venation conspicuous, pale, alternating with broader, reddish purple interveinal bands, becoming scarious towards margin; adaxial surface appressed-hairy in central portion; the margins densely ciliolate with hairs to *c.* 0.1 mm long. *Corolla tube* white, broadly campanulate, usually about as long as to distinctly shorter than sepals, 1–1.6 mm long, 1.5–1.8 mm wide, glabrous externally and internally. *Corolla lobes* white, often partially tinged pink or sometimes pink throughout, longer than the tube (ratio = 1.1–2.1:1), widely spreading from base and recurved, 1.7–2.7 mm long, 0.8–1.0 mm wide at base, glabrous externally, densely bearded internally, indumentum white, 0.4–0.6 mm long near apex, the glabrous tip to 0.2 mm long. *Anthers* usually slightly exerted from the tube, less often partially exerted (by 7/8 or more of length), (0.7–)0.9–1.5 mm long, slightly or prominently recurved at apex; sterile tips usually rather conspicuous, 0.2–0.3 mm long; *filaments* terete, attached 1/2–3/4 above anther base, (0.5–)0.7–1.1 mm long, adnate to tube just below sinus. *Ovary* broadly ellipsoid to globose, 0.5–0.7 mm long, 0.5–0.7 mm wide, glabrous, (3–)4 or 5-locular; *style* 0.5–0.8 mm long, abruptly differentiated from ovary apex, cylindrical for most of length, included within corolla tube; *stigma* slightly to distinctly expanded; *nectary* annular, 0.2–0.4 mm long, usually lobed for 1/3–1/2 (–3/4) of length, but occasionally entire, glabrous. *Fruit* rather variable in shape, ellipsoid, broadly ellipsoid, globose or occasionally slightly depressed-globose, with smoothly rounded shoulders, glabrous, 3–4.5 mm long, 2.6–3.2 mm wide, much longer than calyx, the surface with a prominently raised reticulum of transverse and longitudinal ridges; style persistent. (Figure 6)

Selected specimens examined. WESTERN AUSTRALIA: Gum Link Rd, 1.7 km W of Nornalup Rd, 20 Aug. 1990, *A.R. Annels* ARA 1210 (CANB, PERTH); Mt. Magog, Stirling Range National Park, 18 Oct. 1994, *S. Barrett* 50 (PERTH); Ellen Track, near junction with South Bluff track, [Stirling Range National Park], 8 Feb. 2006, *S. Barrett* 1431 (CANB, PERTH); Porongurups, Aug. 1958, *A. Chapman s.n.* (PERTH 05904331); Mt Trio, vicinity of carpark and 100 m up trail, Stirling Range National Park, 30 Oct. 1986, *R.S. Cowan* A-502 (CANB, K, NSW, PERTH); Plot FC41, 100 m off Keene Rd on unnamed logging track, Barrabup Forest Block, 6 Sep. 2005, *R.J. Cranfield & B.G. Ward* FC 913A (PERTH); 4.3 km N along Cup Rd from Muir Highway [NW of Lake Muir], 19 Feb. 1998, *R. Davis* 6053 (PERTH); Elwin Rd sandpit, Bridgetown, 5 July 1996, *J. Dewing* 778 (PERTH); between Napier and Mount Manypeaks, 5 Oct. 1967, *A.R. Fairall* 2254 (PERTH); Northcliffe Forest Park, 18 Aug. 1991, *L. Graham* 767 (PERTH); corner of Crouch Rd & Great North Rd, Whicher Range, 20 Aug. 2004, *M. Hislop* 3296 (PERTH); Pitcher Plant Rd, 100 m S of Beardmore Rd, N of Walpole, 29 Dec. 2005, *M. Hislop* 3564 (NSW, PERTH); close to Sues Bridge Campsite, on Blackwood River, W of Nannup, 26 Nov. 2006, *M. Hislop* 3679 (CANB, PERTH); Kent River Siding, Walpole to Denmark,

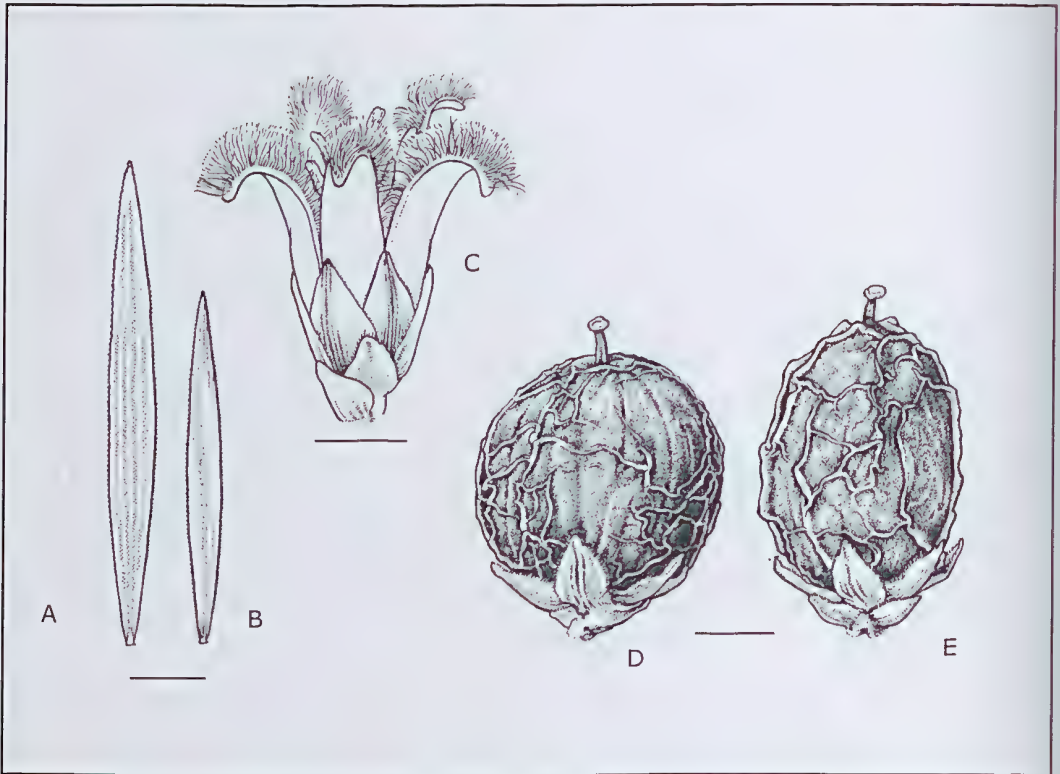


Figure 6. *Leucopogon interstans*. A, B – leaves, adaxial surface; C – flower; D, E – fruit. Scale bars: A, B = 5 mm; C, D, E = 1 mm. Drawn by Margaret Wilson from R.J. Cranfield & B.G. Ward 913A (A, C), A. Strid 20552 (B), M. Hislop 3679 (D), M. Hislop 3564 (E).

11 Aug. 1986, G.J. Keighery 8273 (PERTH); Windy Harbour Rd, 9 Sep. 1971, S. Paust 312 (PERTH); Kalgan River, 23 Oct. 1992, L.J. Pen LJP 202 (PERTH); c. 9 km NNW of Denmark on Mt Lindesay Rd, 1 km W of Denmark River, 16 Aug. 1979, J.M. Powell 1193 (CANB, HO, K, L, NSW, PERTH); track to Marmabup Rock across Devils Slide, Porongurup National Park, 18 Aug. 1979, J.M. Powell 1210 (CANB, K, L, NSW, PERTH); slope N of stream on track to Bluff Knoll summit, Stirling Range National Park, 19 Aug. 1979, J.M. Powell 1235 (K, L, NSW, PERTH); Youngermere track, c. 400 m E of Chester Pass Rd, Stirling Range National Park, 30 Aug. 1986, J.M. Powell 2733 (NSW, PERTH); Site 130, S of Beardmore Rd, E of South Western highway, [N of Walpole], 25 Aug. 1997, K.A. Redwood 504 (PERTH); Scott River National Park, 6 Sep. 1990, C.J. Robinson 31 (PERTH); Stirling Range National Park, lower slopes SE of Toolbrunup Peak, 26 Sep. 1982, A. Strid 20552 (PERTH); Walpole–Nornalup National Park, Twenty Eight Mile Rd at N boundary of park, 12 Aug. 1992, J.R. Wheeler 3143 (PERTH); just N of Stirling Range National Park, c. 25 km E of Cranbrook, 18 Sep. 1964, P. Wilson 3322 (AD, PERTH); on the summit of Bluff Knoll, Stirling Range National Park, 31 Oct. 1994, A. Worz 04.10.31.05 (PERTH).

Distribution and habitat. *Leucopogon interstans* is widespread in the south-west corner of Western Australia from the Scott River area near Augusta, eastwards to Albany, and as far north as Bridgetown and the Stirling Range (Figure 7). Across most of its range, *L. interstans* is a plant of woodland and forest, where it grows in loam or sandy loam soils. In the Stirling Range, however, as well as occurring in woodlands on the lower slopes, it is also present as a component of heathland communities on the upper slopes of the mountains.

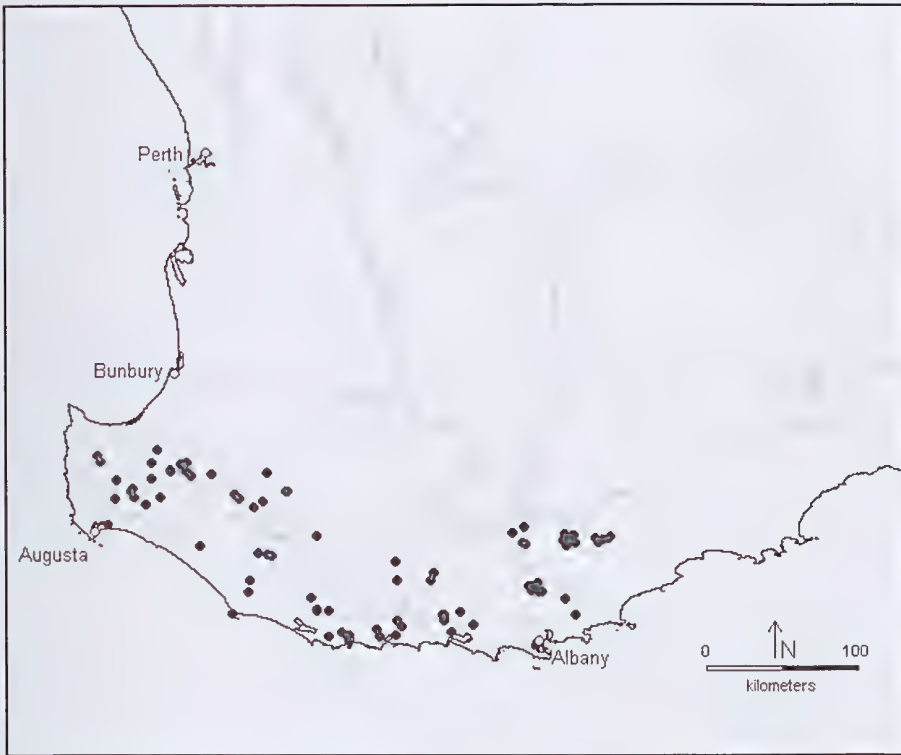


Figure 7. Distribution of *Leucopogon interstans* (●) in south-west Western Australia. *Interim Biogeographic Regionisation Version 6.1* (Department of the Environment, Water, Heritage and the Arts 2008) boundaries are indicated in grey.

Phenology. Peak flowering occurs from August to October and mature fruit have been collected between November and February.

Eymology. The specific epithet is from the Latin *interstans* (standing in between), a reference to the vegetative morphology of the new species which is somewhat intermediate between *L. australis* and *L. capitellatus* DC., the two species with which it has often been confused.

Conservation status. *Leucopogon interstans* is common across its range and is conserved in a number of National Parks and Nature Reserves.

Affinities. *Leucopogon interstans* is morphologically similar to *L. australis* and *L. capitellatus*. From the former, the new species differs in having scabrous rather than glabrous leaf margins, more acute sepals which are always tinged reddish purple when in flower (although fading in fruit), and ellipsoid or globose (very occasionally slightly depressed-globose), rather than strongly depressed-globose fruit.

Smaller-leaved plants may be mistaken for *L. capitellatus*. The two species share scabrous leaf margins, although the marginal hairs are longer in the latter and the upper leaf surface is hairy (glabrous in *L. interstans*, apart sometimes for a few hairs at the very base). Additionally, the branchlet indumentum of *L. capitellatus* is much longer, the sepals are manifestly obtuse and the inflorescence is shorter and denser.

The three species are sympatric across large areas of the southern forest, and although specimen-based evidence is limited, it seems likely that they would regularly share the same habitat. *Leucopogon interstans* and *L. australis* are certainly known to grow side by side on and around the Whicher Range, for example, as confirmed by the following collections—*R.J. Cranfield & B.G. Ward* FC 913A and 913, and *M. Hislop* 3679 and 3678 (in both cases *L. interstans* and *L. australis* respectively). In the Porongurup Range *L. capitellatus* and *L. interstans* also grow along side each other, as demonstrated by the specimen pair *A. Chapman s.n.* (PERTH 05904331) and *A. Chapman s.n.* (PERTH 07512279) (*L. interstans* and *L. capitellatus* respectively).

Notes. *Leucopogon interstans* is a variable species in regard to leaf size, inflorescence length, fruit shape and in some floral details. The Stirling Range populations represent the most distinctive form of the species, especially in terms of their foliar morphology. These usually have leaves that are concave adaxially, less often flat, and only very occasionally convex. By contrast forest populations of the species have convex leaves as the norm with the occurrence of concave leaves apparently uncommon. In addition, leaves of plants from the Stirling Range are generally smaller and have more acuminate apices (especially from plants collected in the high peaks). Floral measurements are also usually at the lower end of those recorded for the species as a whole with sepal length as low as 1.2 mm long (compared to a minimum of 1.4 mm elsewhere), anther length down to 0.7(–0.9) mm and filaments to 0.5(–0.7) mm. Additionally, the nectary is often more deeply lobed and the flowers sometimes have 3-locular as well as the usual 4 or 5-locular ovaries.

Although such differences appear to indicate a level of divergence in these Stirling Range populations, no morphological characters by which to consistently separate them from the forest populations were identified during this study. In the case of leaf curvature, the strongest of the foliar characters, two specimens from the Stirling Range housed at PERTH (i.e. *J.M. Powell* 2733 and *F.W. Went* 155) have leaves either all convex in the latter case, or a combination of convex and concave in the former. Conversely in the southern forests, where convex leaves are the norm, occasional examples can be found of specimens with predominantly concave leaves (e.g. *K.A. Redwood* 345, from north-east of Denmark and *R. Davis* 7748, from west of Nannup). Additionally, collections from the Porongurup Range, to the south of the Stirling Range, may have either concave or convex leaves. Although the Stirling Range populations tend to have somewhat smaller flowers, there are no clear disjunctions in floral morphology, and the variation in fruit shape described above occurs within the forest populations. Only ellipsoid drupes have been observed on collections from the Stirling Range.

Bentham's concept of *Leucopogon richiei* var. *acutifolius* was presumably restricted to the Stirling Range variant as Mueller's holotype is the only collection cited.

Leucopogon polystachyus R.Br., *Prod. Fl. Nov. Holl.* 542 (1810). *Styphelia polystachyus* (R.Br.) Spreng., *Syst. Veg.* 1 (1824). *Type:* King George Sound, between Princess Royal Harbour and Cape Howe [Western Australia], December 1801, *R. Brown s.n.* (*lecto*, here designated: BM 000929101!; *isolecto*: BM 000929102!, MEL 78545, scanned image seen).

Leucopogon polystachyus var. *serratifolius* Sond. [published as β *serratifolius*] in C. Lehmann, *Pl. Preiss.* 1: 308 (1845). *Type:* 'In arenoso-turfosis humidis inter fructices densos prope villam beat Rich. Spencer, Plantagenet', 23 September 1840, *L. Preiss* 364 (*lecto*, here designated: MEL 78550; *isolecto*: MEL 78549, scanned images seen).

Leucopogon polystachyus var. *monostachys* Sond. [published as γ *monostachys*] in C. Lehmann, *Pl. Preiss.* 1: 308 (1845). Type: 'Habitat cum priore', 23 September 1840, *L. Preiss* 364 ex parte (*holo*: MEL 78551, scanned image seen).

Other specimens examined. WESTERN AUSTRALIA: Kordabup Rd, Denmark, 12 Sep. 1991, *A.R. Annels* 1654 (PERTH); Deeside Coast Rd, Re/JL 81, Manjimup, 17 Oct. 1983, *A.R. Annels* 1705 (PERTH); c. 400 m along Ficifolia Rd from junction with Nut Rd, N side of road, Walpole–Nornalup National Park, 10 Oct. 2003, *D.M. Crayn* 719, *K.A. Kron* & *A.J. Perkins* (NSW, PERTH, WFU); roadside above Cosy Corner Beach, off Lower Denmark Rd, Albany, 13 Sep. 1987, *E.J. Croxford* 5656 (PERTH); corner of Steve Rd and unnamed track, c. 2.4 km E of Chesapeake Rd [S of Northcliffe], 29 Sep. 1996, *M.S. Graham*, *M.D. Carter* MSG 602 (CANB, PERTH); Boronia Rd, 1.5 km E of Collis Rd [NE of Walpole], 6 Oct. 1997, *M.S. Graham* MSG 863 (PERTH); Denbarker state forest, Nutcracker Rd, 2.5 km W of Denmark–Mount Barker Rd, 4 Sep. 1994, *B.G. Hammersley* 1128 (NSW, PERTH); Grasmere, 12 km W of Albany, 7 Dec. 1986, *G.J. Keighery* 9024 (CANB, PERTH); lower slopes of Mt Lindesay, 16 Aug. 1979, *J.M. Powell* 1205 (BRI, CANB, MEL, NSW, NY, PERTH); roadside towards Elleker, W of Albany, 20 Aug. 1993, *C.J. Robinson* 1121 (PERTH).

Notes. The morphological basis for the recognition of Sonder's (1845) two infraspecific taxa is slight. Bentham (1868) ignored them completely in his treatment of the species, despite including *Preiss* 364 (the type number for both of these varieties) in his list of cited specimens. Sonder (1845) separated var. *serratifolius* from the typical form of *L. polystachyus* on the basis of differences in leaf morphology, with the former having more spreading leaves with serrulate (rather than glabrous) leaf margins and a more acute apex. Variety *monostachys* was said to differ primarily in its single-spiked inflorescence.

An examination of collections of *L. polystachyus* held at PERTH does not support the recognition of either of these taxa. The leaf orientation of *L. polystachyus* is generally steeply antrorse, although occasionally the lower leaves may be more or less spreading. The shape is usually narrowly or very narrowly ovate, less often narrowly elliptic, and the apex is a blunt callus which varies very slightly in width. As with many species of *Leucopogon s. str.*, details of the indumentum on vegetative parts of the plant vary considerably. Most collections have leaves which are more or less ciliate when young. Generally these hairs are soon lost as the leaves mature, leaving only the thickened bases which produce the more or less serrulate margins observed by Sonder (1845). Less often these hairs persist at maturity, or are entirely absent, as is the case with the type collection of *L. polystachyus*. Those specimens that lack any semblance of marginal hairs, even on the youngest leaves, have all been collected towards the eastern end of the species' range in the Albany–Denmark area. Differences in leaf and branchlet indumentum within this species, however, do not appear to correlate with any floral or fruiting characters.

Although the single-spiked conflorescence used by Sonder as the basis for his recognition of var. *monostachys* is unusual, this characteristic is observable sometimes on the lower branchlets of specimens with otherwise typical, multispicate conflorescences (e.g. *E.J. Croxford* 5656) and clearly has no taxonomic significance.

Leucopogon wheelerae* Hislop, *sp. nov.

Leucopogi alternifolio affinis sed floribus et fructis grandioribus, lobis corollae magis dense pilosis differt.

Typus: north-west of Augusta [precise locality withheld for conservation reasons], Western Australia, 10 October 1997, E.A. Brown 97/262 & G. Taaffe (*holo*: PERTH 05073790; *iso*: CANB, NSW, NY, UNSW).

Sprawling *shrubs* to 80 cm high and 80 cm wide, single-stemmed at ground level, with a fire-sensitive rootstock. Young *branchlets* very slender, pale brown or reddish-purple, glabrous; bark on older branchlets grey, ± fissured. *Leaves* spirally arranged, antrorse, ovate or broadly ovate, 3.5–7.9 mm long, 2.6–7.2 mm wide; apex acute or subacute, recurved or straight; base cordate, often deeply so and ± stem clasping; petiole indistinct, glabrous, pale brown or reddish-brown, to *c.* 0.2 mm long; lamina 0.1–0.3 mm thick, usually slightly recurved along longitudinal axis, concave, often deeply so with the adaxial surface ± folded longitudinally, but usually becoming slightly recurved towards the margins; surfaces discolorous, glabrous, adaxial surface slightly shiny, venation not or barely evident, except sometimes close to the base, abaxial surface paler with 7–9(–11) primary veins and significant development of secondary veins, the midrib not differentiated; the margins pale, slightly thickened, entire or crenulate, glabrous. *Inflorescence* erect or spreading, terminal and axillary, the latter extending down the flowering branchlet for many nodes; axis glabrous or occasionally with a very sparse indumentum of short patent hairs, 4–7 mm long, with 4–12 flowers, terminating in a bud-like rudiment or acute point, flowers erect and sessile. *Fertile bracts* broadly ovate or ovate, 0.9–1.3 mm long, 0.9–1.2 mm wide, obtuse to subacute; abaxial surface with moderately conspicuous venation, glabrous or minutely papillose; adaxial surface appressed-hairy; margins minutely ciliate. *Bracteoles* broadly ovate or ovate, 0.7–1 mm long, 0.7–0.9 mm wide, subacute, rather obscurely keeled; abaxial surface usually minutely papillose about the keel, glabrous elsewhere, the central portion greenish, becoming paler and scarious towards the margins, or frequently the whole surface suffused reddish purple, the venation usually moderately conspicuous; adaxial surface appressed-hairy; the margins minutely ciliate. *Sepals* ovate or narrowly ovate, 1.5–2.1 mm long, 0.6–1 mm wide, subacute; abaxial surface minutely papillose at least towards apex, the central portion greenish often suffused reddish-purple, with the pale venation rather conspicuous, either becoming scarious towards the margins or more often the whole surface suffused reddish purple; adaxial surface appressed-hairy towards the apex; the margins minutely ciliate with hairs < 0.05 mm long. *Corolla tube* white, broadly campanulate, about as long as, slightly longer than, or slightly shorter than the sepals, 1.3–1.8 mm long, 1.5–1.7 mm wide, glabrous externally, but with hairs extending onto the inner surface of the tube below the lobes for up to 0.5 mm. *Corolla lobes* white or pale pink, longer than tube (ratio = 1.1–1.4: 1), widely spreading from base and recurved, 1.7–2.1 mm long, 0.8–1 mm wide at base, glabrous externally, densely bearded internally, indumentum white, 0.3–0.5 mm long near apex, the glabrous tip 0.1–0.2 mm long. *Anthers* partially exerted from the tube (by *c.* 2/3 of length), 1.2–1.6 mm long, prominently recurved at apex; sterile tips rather conspicuous, 0.4–0.7 mm long; *filaments* terete, attached 1/2–2/3 above anther base, 0.4–0.5 mm long, adnate to tube just below sinus. *Ovary* globose or broadly ellipsoid, 0.5–0.6 mm long, 0.5–0.6 mm long, glabrous, 3(4)-locular; *style* 0.5–0.7 mm long, tapering from base to apex, minutely papillose; included within the corolla tube; *stigma* slightly to distinctly expanded; *nectary* annular, 0.2–0.3 mm long, lobed for up to 1/3 of length, glabrous. *Fruit* elliptic or asymmetrically elliptic in outline, compressed when 1 or 2 ovules develop, or trigonous, when all 3 develop, glabrous or minutely papillose towards the apex, 1.8–2.1 mm long, 1.1–1.5 mm wide, longer than the calyx, the surface with a raised reticulum; style persistent. (Figure 1 C–E)

Other specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 10 Aug. 1995, R.W. Hearn, R. Annear & A.R. Annels ARA 5393 (PERTH); 8 Sep. 1965, A.C. Beaglehole 12571 (NSW, PERTH); 3 Feb. 1997, E. Bennett & B. Evans P 26.1 (PERTH); 24 Aug. 1986, A.R. Chapman 356 & J.M. Powell (NSW, PERTH); 9 Oct. 2000, R.J. Cranfield 15484 (CANB, NSW, PERTH); 19 Sep. 1995, R. Davis 146 (PERTH); 2 Oct. 1976, A.S. George s.n. (PERTH)

1024442); 26 Nov. 2006, *M. Hislop* 3680 (CANB, PERTH); 8 Sep. 1971, *S. Paust* 254 (NSW, PERTH); 9 Nov. 1985, *J.M. Powell* 3072 (HO, NSW, PERTH); 25 Sep. 1990, *C.J. Robinson* 152 (PERTH).

Distribution and habitat. Occurs in the far south-west corner of Western Australia between the Hardy Inlet, near Augusta, and the Donnelly River (Figure 2). In this area the species is restricted to heath or woodland edge on seasonally wet flats.

Phenology. The main flowering period is from August to October. Mature fruit has been collected in November but is probably present as early as October through to the end of the year.

Etymology. The species epithet honours Judith R. Wheeler, botanist at the Western Australian Herbarium 1982–2002. Judy made a substantial contribution towards a better understanding of Western Australia's large and complex flora, both through the leading role that she played in the production of three regional floras, and as a taxonomist working on the genera *Hibbertia* and *Agonis* (and segregate genera). In her treatment of *Leucopogon* for the *Flora of the South West* (Wheeler *et al.* 2002), Wheeler first drew attention to some of the differences between the eastern and western populations of *Leucopogon alternifolius* that have been formally recognised here.

Conservation status. *Leucopogon wheelerae* is a locally common species occurring in a narrow east–west band, apparently less than 50 km long and probably nowhere more than 15–20 km wide. Populations are known to be conserved in the Scott River National Park. It probably also occurs at Gingilup Nature Reserve (unvouchered record), and may well be present at the western end of D'Entrecasteaux National Park, but this has yet to be demonstrated.

As noted above, when *L. alternifolius* was originally removed from the Priority List it was largely on the strength of the discovery of new populations of the segregate species recognised here as *L. wheelerae*. However, in common with two of the other species treated in this paper, *L. altissimus* and *L. alternifolius sens. str.*, *L. wheelerae* is restricted to a small area in one of the wettest districts of southern Western Australia, and as such is likely to be particularly vulnerable to the warming and drying effects of predicted climate change.

Leucopogon wheelerae is recently listed as Priority Three under DEC Conservation Codes for Western Australian Flora.

Affinities. *Leucopogon wheelerae* is clearly closely related to the species with which it has hitherto been confused, *L. alternifolius*. The larger floral parts and fruit of the new species however, together with its campanulate corolla tube and more densely hairy corolla lobes will readily separate the two. The distinctive fruit character that the two species share is not seen elsewhere among the Western Australian members of *Leucopogon s. str.* A recent study of molecular sequence data (Quinn *et al.* 2003) however, supported Bentham's (1869) observation that the eastern Australian *Leucopogon amplexicaulis* R.Br. is likely to be a close relative.

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References

- Atkins, K.J. (2008). *Declared Rare and Priority Flora List for Western Australia* (Department of Environment and Conservation: Kensington, WA.)
- Benthām, G. (1868). *Flora Australiensis*. Vol. 4 (L. Reeve: Covent Garden.)
- Brown, R. (1810). *Prodromus florae Novae Hollandiae*. Vol. 1. (Johnson: London.)
- Department of the Environment, Water, Heritage and the Arts (2008). Interim Biogeographic Regionalisation for Australia (IBRA). Version 6.1. <http://www.environment.gov.au/parks/nrs/science/bioregion-framework/ibra/index.html> [accessed 8 May 2008]
- Hislop, M. & Chapman, A.R. (2007). Three new and geographically restricted species of *Leucopogon* (Ericaceae: Styphelioideae: Styphelieae) from south-west Western Australia. *Nuytsia* 17: 165–184.
- Keighery, G.J. (1996). Phytogeography, biology and conservation of Western Australian Epacridaceae. *Annals of Botany* 77: 347–355.
- Kron, K.A., Judd, W.S., Stephens P.F., Crayn D.M., Anderberg A.A., Gadek P.A., Quinn C.J. & Luteyn J.L. (2002). A phylogenetic classification of Ericaceae: molecular and morphological evidence. *Botanical Review* 68: 335–423.
- Mueller, F. von (1867). *Fragmenta phytographiae Australiae*. Vol. 6. (Govt. Printer: Melbourne.)
- Paczkowska, G. & Chapman, A.R. (2000). *The Western Australian flora; a descriptive catalogue*. (Wildflower Society of Western Australia: Nedlands, WA.)
- Quinn, C.J., Crayn, D.M., Heslewood, M.M., Brown, E.A. & Gadek, P.A. (2003). A molecular estimate of the phylogeny of Styphelieae (Ericaceae). *Australian Systematic Botany* 16: 581–594.
- Sonder, O.G. (1845). Epacrideae. In: Lehmann, C. (ed.) *Plantae Preissianae*. Vol.1. (Meissneri: Hamburg.)
- Taaffe, G., Brown, E.A., Crayn, D.M., Gadek, P.A. & Quinn, C.J. (2001). Generic concepts in Styphelieae: resolving the limits of *Leucopogon*. *Australian Journal of Botany* 49: 107–120.
- Western Australian Herbarium (1998–). *FloraBase – The Western Australian Flora*. Department of Environment and Conservation. <http://florabase.calm.wa.gov.au/> [accessed February 2008]
- Wheeler, J., Marchant, N. & Lewington, M. (2002). *Flora of the south west: Bunbury–Augusta–Denmark*. Vol. 2 : Dicotyledons (Australian Biological Resources Study: Canberra).